on radials from the NAF Key West Runway 7 threshold when landing on that runway.

- **IFR Conditions** - Under IFR conditions, NAF Key West ATCT and radar approach/departure control personnel provide position and altitude data to all aircraft. Departures from EYW are held whenever an instrument approach under IFR conditions is made to either EYW Runway 9/27 or NAF Key West runways. The IFR airspace structure surrounding EYW is presented in Figure 1.18.

- **ATCT and Radar** - The EYW ATCT is operational from 0700 to 2100 p.m. NAF Key West ATCT and radar approach/departure facilities are operational from 0600 to 2200 and are served by an airport surveillance radar (ASR-8) unit. They interface with the Miami air route traffic control center (ARTCC). The ARTCC provides airspace services to the combined airspace from 2200 to 0600.

- **Non-Precision Instrument Procedures** – As of October 2002, there are three non-precision instrument approaches available at EYW. These approaches consist of straight-in GPS approaches to Runway 9 and Runway 27 as well as a circling approach. NAF Key West has six Airport Surveillance Radar (ASR) approaches, three Precision Approach Radar (PAR) approaches, three Tactical Air Navigation (TACAN) approaches and one Very High Frequency Omnidirectional Range (VORTAC) approach.

- **Warning Areas** - NAF Key West and EYW airspace is adjacent to the Air Defense Identification Zone (ADIZ), the United States Defense Area, and numerous warning areas outside of FAA jurisdiction and over international waters. Traffic from the north and northeast is routinely routed clear of warning areas. The U.S. Navy states that some warning areas are used for high-speed aerial combat training including surface-to-air and air-to-air missile firings and anti-aircraft gunnery.

- **Obstructions** - Obstructions within 25 NM of EYW include the following:

  - **Balloon** - Strobe lighted and marked balloon to 14,000 feet MSL 14 NM northeast of airport.
  - **Towers** – Numerous towers are located west, north and east of airport. These towers have elevations ranging from 143 to 611 feet.

1.5.3 FLIGHT CORRIDORS

Low altitude Federal Airways, shown on the Miami Sectional Aeronautical Chart, in the vicinity of EYW are listed in Table 1.4. Low altitude Federal Airways are corridors defined by radials between very high frequency omnidirectional radio range (VOR) ground radio stations. They provide navigational guidance to aircraft that are equipped with onboard equipment capable of receiving signals from those stations.

TABLE 1.4
FLIGHT CORRIDORS
Key West International Airport
Master Plan Update

Flight Corridor	From	To	Bearing (Degrees)
V225	Key West VOR EYW	Lee County VORTAC	360°
V539	Key West VOR EYW	Lee County VORTAC	015°
V601	Key West VOR EYW	Miami VOR	037°
V157	Key West VOR EYW	Miami VOR	040°
V3	Key West VOR EYW	Miami VOR	082°

Source: Miami Sectional Chart, February 2001.
Compiled by URS Corporation, 2001.

1.5.4 NAVIGATIONAL AND VISUAL AIDS

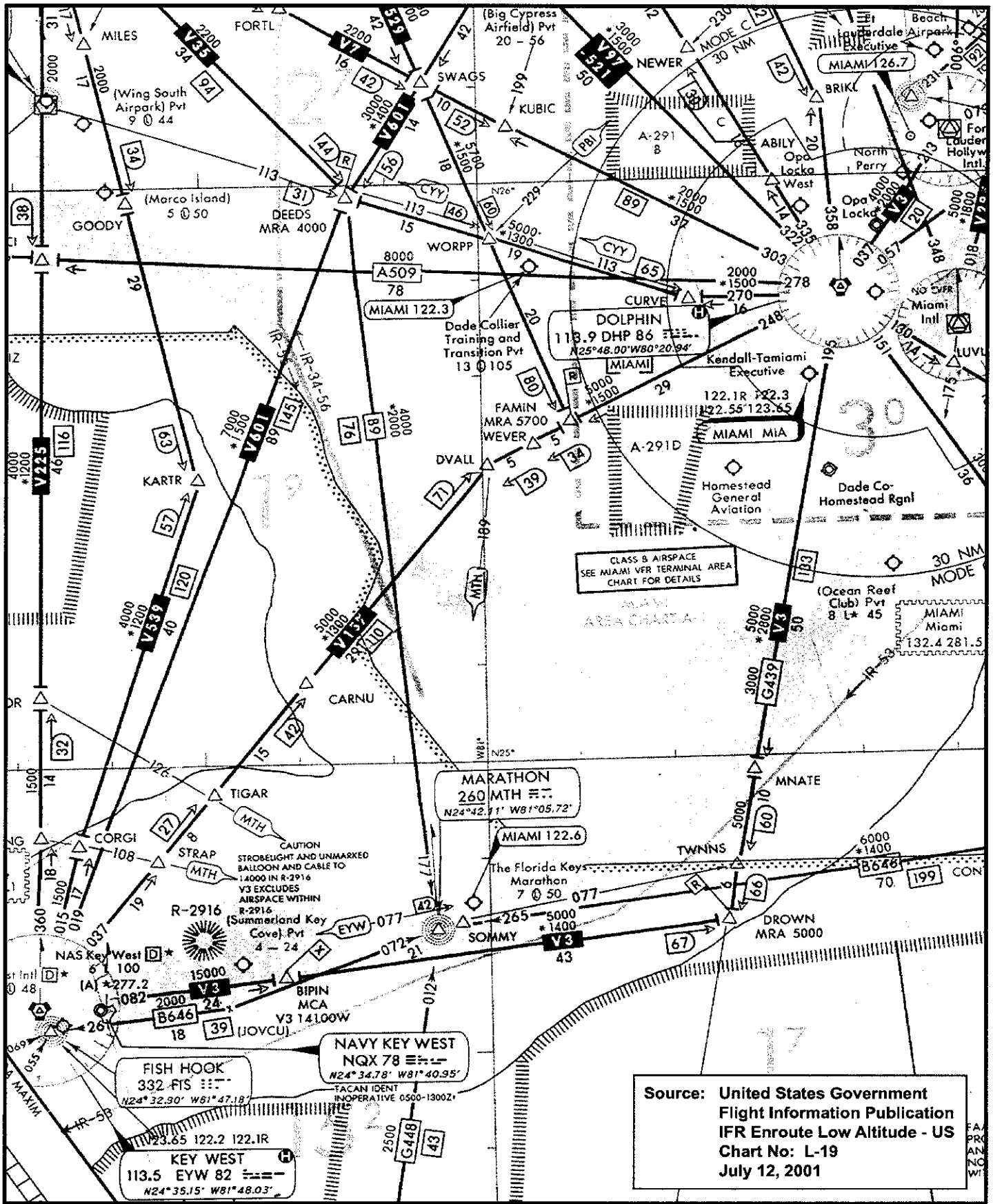
Existing navigational and visual aids (NAVAIDS) located on EYW include a rotating beacon, runway end identifier lights (REILs), visual approach slope indicators (VASIs), lighted wind cone, and medium intensity runway lights (MIRLs). NAVAIDs at EYW can be viewed on Figure 1.1, previously referenced.

1.5.5 EXISTING PUBLISHED APPROACHES

Existing published approaches (effective 3 October 2002) to EYW, available to aircraft operators after obtaining clearance from the U.S. Navy approach control and the EYW air traffic control tower (ATCT), include GPS approaches to Runways 9 and 27 as well as a circling NDB or GPS-A approach. These approaches are depicted in Figures 1.19 through 1.21.

1.5.6 EYW ATCT

Air traffic control services at EYW have been provided by a FAA contract tower since August 28, 1995. The ATCT is operational from 7:00 a.m. through 9:00 p.m.

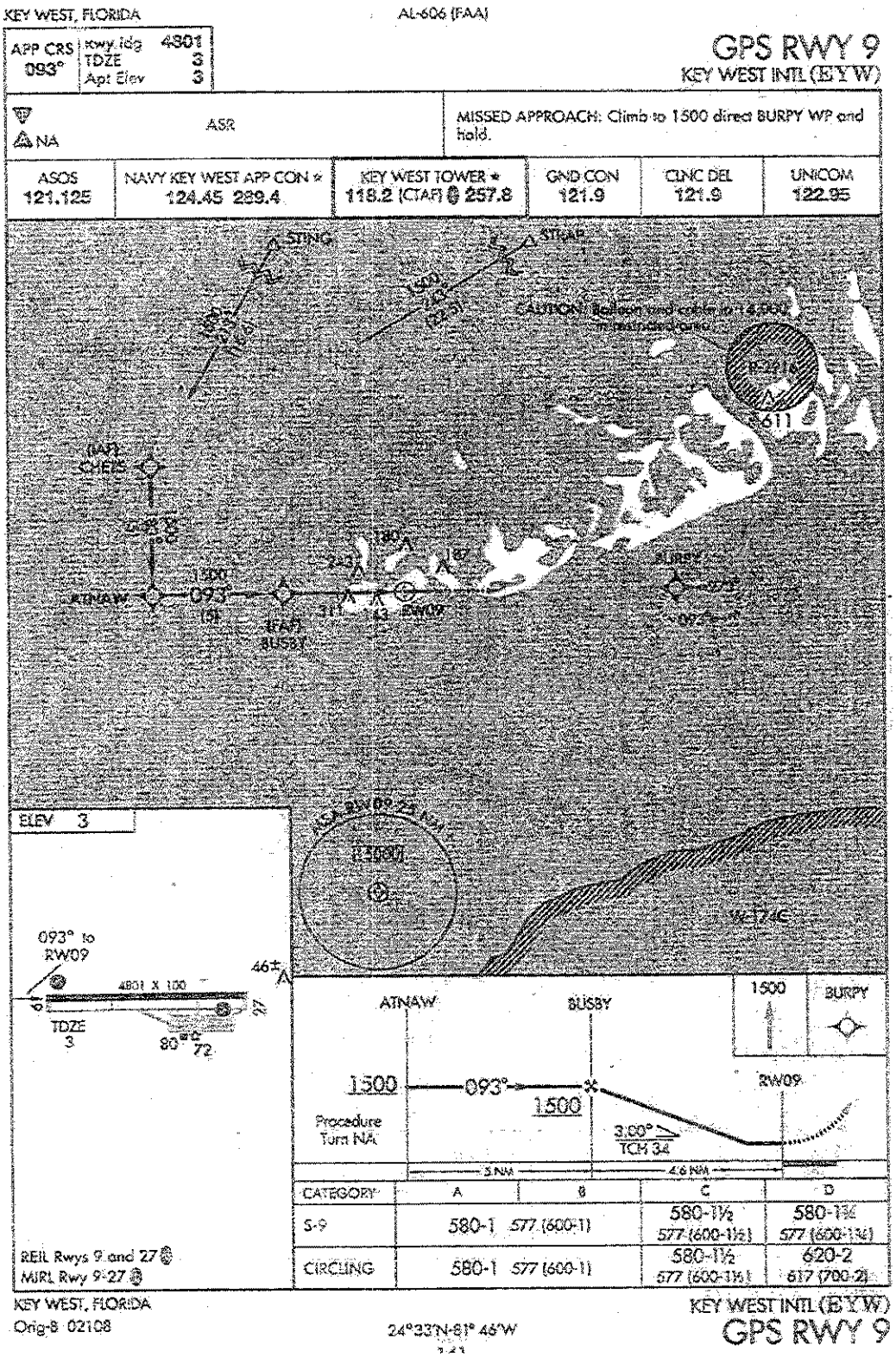


Key West International Airport
Master Plan Update

IFR LOW ALTITUDE AIRSPACE STRUCTURE

FIGURE: 1.18

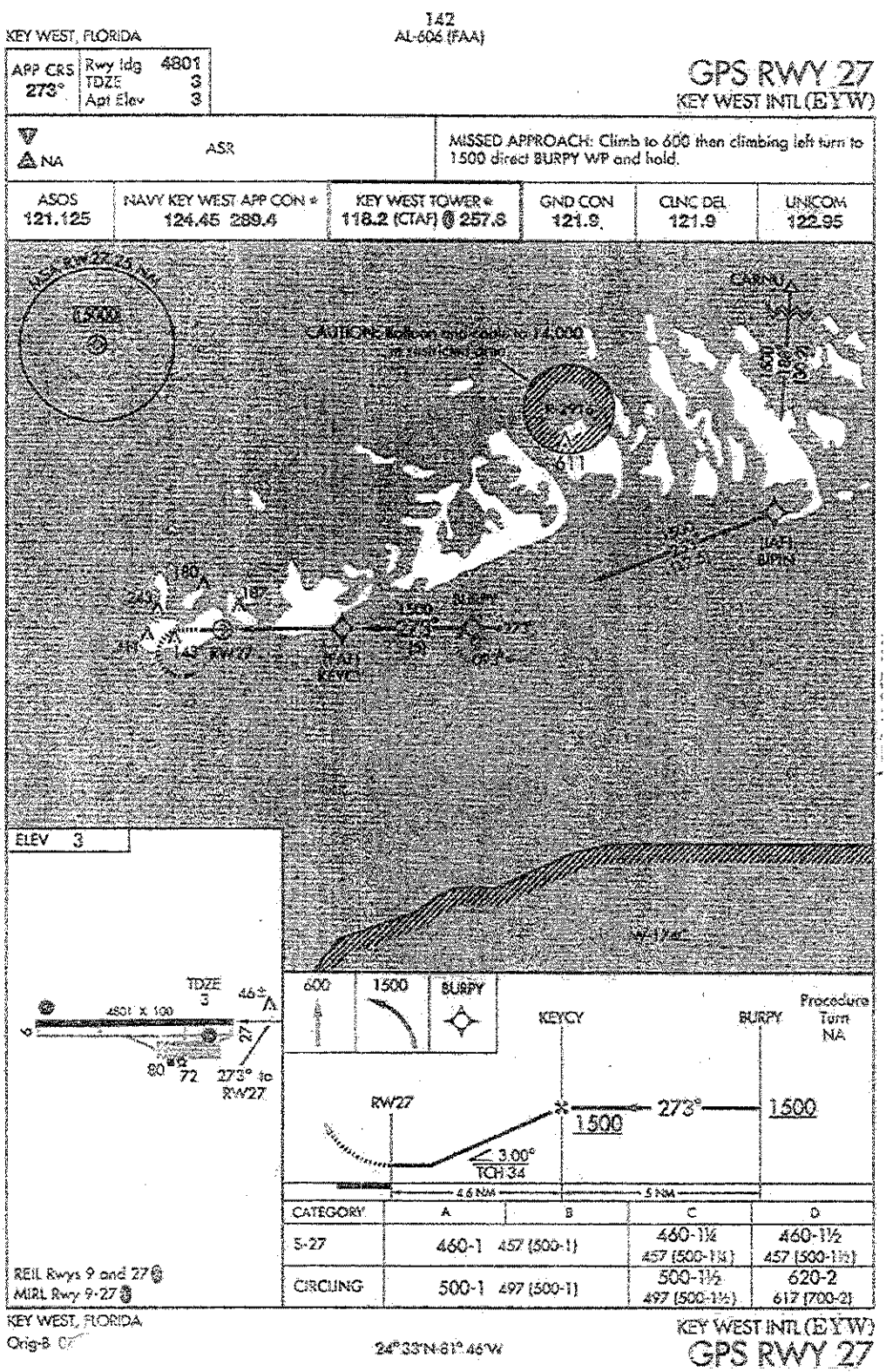
GRAPHICS\KEYWEST\MARATHON AIRPORT\FIG-1-18.AI



Source: United States Government
Flight Information Publication
U.S. Terminal Procedures
Southeast Volume 3 of 4
October 3, 2002

Key West International Airport Master Plan Update	INSTRUMENT APPROACH PROCEDURE GPS RUNWAY 9	FIGURE: 1.19

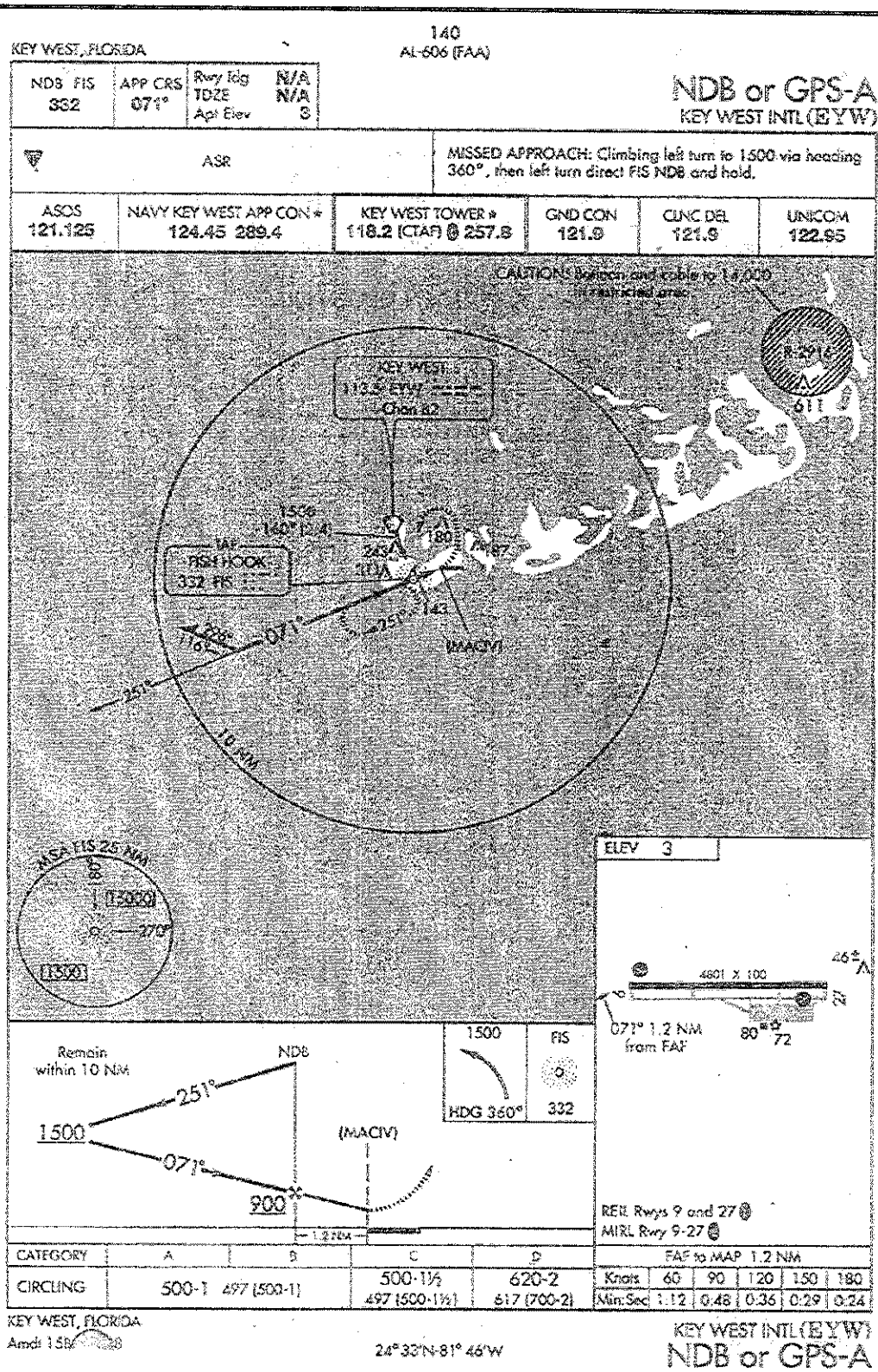
GRAPHICS\MARATHON\APR\P2001-FIG-1_19_IAP-GPS9.AI



Source: United States Government
Flight Information Publication
U.S. Terminal Procedures
Southeast Volume 3 of 4
October 3, 2002

Key West International Airport Master Plan Update	INSTRUMENT APPROACH PROCEDURE GPS RUNWAY 27	FIGURE: 1.20

GRAPHICS/MARATHONAP/MP2001-FIG-1-20-IAP-GPSRWY27.AI



Source: United States Government
Flight Information Publication
U.S. Terminal Procedures
Southeast Volume 3 of 4
October 3, 2002

GRAPHICS\MARATHON\APU\P2001-FIG-1-21-I4P-NDB-GPS-A.AI

Key West International Airport Master Plan Update	INSTRUMENT APPROACH PROCEDURE NDB OR GPS-A	FIGURE: 1.21

1.5.7 RUNWAY PROTECTION ZONES (RPZ)

Existing RPZs for each end of Runway 9/27 are 1,700 feet in length, 500 feet wide at the inner edge, and 1,010 feet wide at the outer edge. These RPZ dimensions are the current standard for visual and not lower than 1-mile visibility non-precision approaches by aircraft approach categories C and D. The approach slope associated with these RPZs is 34:1.

Portions of these RPZs are not under the full control of the airport. An area of approximately 2 acres on the northern edge and 1.4 acres on the southern edge of the RPZ for Runway 27 is privately owned. Approximately 2.5 acres of the north edge of the RPZ for Runway 9 is owned by the City of Key West. The adequacy of these RPZs for future operations will be discussed in Section 6 – Airport Plans.

1.6 ENVIRONMENTAL DATA

Primary environmental features affecting airport development and operations are salt ponds and mangroves. A description of principal salt ponds and stands of mangroves and the effect on airport development and operations follows.

1.6.1 SALT PONDS

Salt ponds exist on all four sides of the airport. Some ponds are connected to the Atlantic Ocean through culverts and are tidally influenced. Others are isolated from tidal influence with water levels fluctuating due to rainfall. Salt ponds and floodplains are depicted in Figure 1.22. Major salt ponds and current enhancement projects are as follows:

- **South of Runway 9** - The largest portion of the salt pond located south of Runway 9 between Roosevelt Boulevard and the airport fence line is on City of Key West property. It extends onto airport property adjacent to the threshold of Runway 9 and the T-hangar area. A former abandoned access road that restricted flow between this salt pond and a salt pond west of the threshold of Runway 9 has been closed and channels have been created to allow free flow of water between these salt ponds.

- **West of Runway 9** - Several salt ponds are located west of the threshold of Runway 9. The majority of these salt ponds are located on airport property.

- **North of Runway** - There are large salt ponds and associated mangrove stands north of the runway extending from south of the Hawk missile site near the north/south portion of Government Road eastward to the abandoned blimp pads.

- **East of Threshold 27** - There are salt ponds and associated mangroves east of the threshold of Runway 27. Almost the entire RPZ is covered with mangroves and salt ponds. In accordance with a consent order, the mangroves have been trimmed to below the runway's approach slope.

- **South of Threshold 27** - Portions of the salt ponds and mangroves in the Runway 27 RPZ extend south of the Runway 27 threshold and east of the commercial aircraft parking apron up to areas developed for non-airport-related commercial uses.

1.6.2 MANGROVES

Stands of mangroves exist in the RPZ for Runway 27 and adjacent to edges of salt ponds. Mangroves beneath the 34:1 approach surface to Runway 27 have been trimmed in accordance with a consent order. Mangroves also border the salt ponds described above around the periphery of the airport.

1.6.3 DEVELOPMENT CONSIDERATIONS

Development activities within areas with wetlands (salt ponds) and/or mangroves will require permits from several regulatory agencies including, but not limited to, the U.S. Army Corps of Engineers, the South Florida Water Management District, and the Florida Department of Environmental Protection. Mitigation would be required for any unavoidable impacts to wetlands. Permits are required for trimming of mangroves.

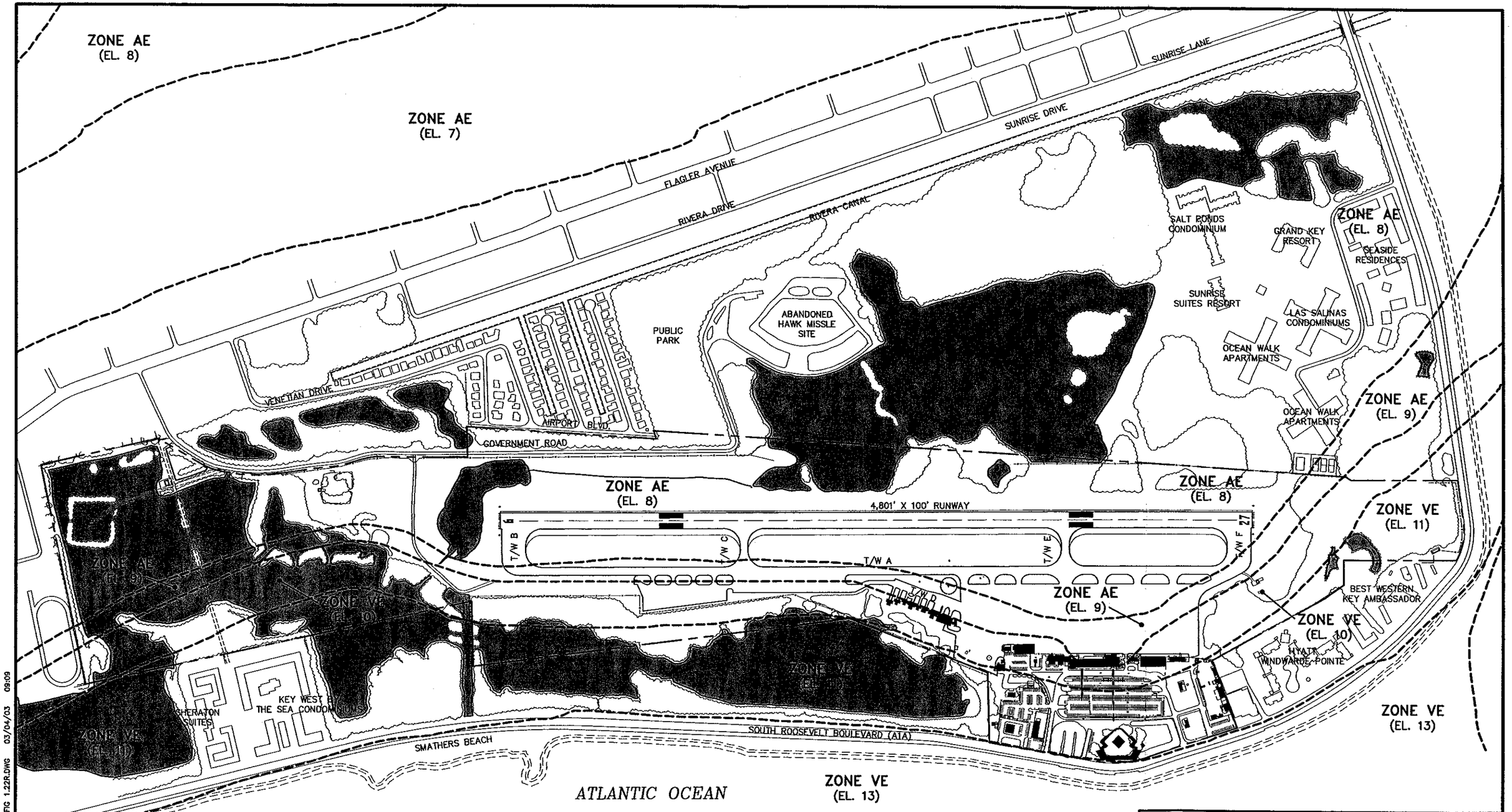
1.7 LAND USE

1.7.1 ADJACENT LAND USE

Land use in the vicinity of EYW was identified through a combination of windshield surveys and a review of aerial photography. A description of the land use is provided below and is depicted in Figure 1.23.

- **North** - Land use to the north of the airport is residential. There is a buffer of City of Key West property consisting of former blimp pads and the former Hawk missile site between airport property and residential property on Riviera Drive. This land was formerly owned by the U.S. Navy, but was transferred to the City of Key West in 2001.

- **East** - Land use east of airport property is a mixture of environmentally sensitive mangroves, and hotel/motel complexes.



LEGEND

- AIRPORT PROPERTY LINE
- WETLAND MITIGATION LINE
- FLOOD ZONE LINE
- SALT POND
- ZONE AE — BASE FLOOD ELEVATIONS DETERMINED
- ZONE VE — COASTAL FLOOD WITH VELOCITY HAZARD (WAVE ACTION); BASE FLOOD ELEVATIONS DETERMINED

N

600 0 600

GRAPHIC SCALE IN FEET
SCALE: 1" = 600'

SALT PONDS & FLOODPLAINS

Key West International Airport
Master Plan Update

FIGURE: 1.22

J:\KEY WEST\MASTER PLAN UPDATE\EXHIBITS\FIG 1.22R.DWG 03/04/03 09:09


Gulf of Mexico
Atlantic Ocean
LEGEND
FUTURE LAND USE
Airport
General Commercial
Limited Commercial
Tourist Commercial
Neighborhood Commercial (HNC-1/HNC-2/HNC3)
Historic Residential/Office
Residential/Office
Single Family Units
Low Density Residential-Coastal
Medium Density Residential
Medium Density Residential-Coastal
High Density Residential
High Density Residential/Com'l Core (HRCC-1 & HRCC-3)
Military
Planned Redevelopment and Development
Public Services, Incl. Recreation & Open Space (Old Town)
Public Services, incl. Recreation, Schools, Public & Semi-Public Lands
Open Space
Tidal Wetlands of the State
Freshwater Wetlands
Mangrove
Outstanding Waters of the State
Upland Hammock
Not Assigned
N
W
E
S
2000 0 2000 Feet
Scale 1"=2,000'
Source: Monroe County Property Apprisal Office, 2000

Key West International Airport
Monroe County, Florida
Master Plan Update

URS

KEY WEST LAND USE

FIGURE: 1.23

- **South** - Land use south of the airport is a mixture of commercial (hotels) recreational (beach) and residential (Key West By the Sea Condominiums).

- **West** - Land use west of airport property is a mixture of institutional (Key West High School), commercial, residential, recreational, and wetlands.

1.7.2 CURRENT AIRPORT LAND USE

Airport property amounts to approximately 255 acres. It is currently in use as follows.

- **Airport Operating Area (AOA)** - The runway, taxiways, and apron with their safety areas, object free areas, building restriction lines, and parking limit lines make up the AOA.

- **Runway Protection Zones (RPZ)** - An RPZ is a protected and controlled area beneath the inner portion of the approach slope. The size, shape, and the slope of the surface above the RPZ is determined on the basis of the category of the highest level of precision of approaches to the runway. The RPZs at EYW are based on non-precision approaches with visibility minimums not lower than one mile. The RPZs are 1,700 feet in length, 500 feet in width at the inner edge, and 1,010 feet in width at the outer edge. The slope of the approach surface above the RPZ is 34:1. The RPZs are approximately 29 acres each for a total of 58 acres.

- **Aviation-Related Use** - Aviation-related use includes the commercial terminal, FBO facilities, cargo facilities, private hangars, and other facilities including auto parking and support facilities or areas related to aviation activities.

- **Non-Aviation-Related Use** - Non-aviation-related land use at EYW includes the County Department of Public Works yard, the Florida Highway Patrol Station, and the Teenage Center of Key West.

- **Recreational** - Recreational land use on airport property includes a public park and the East Martello Gallery and Museum.

- **Environmental Areas** - Environmental areas at EYW include wetlands and mangroves. Portions of the areas extend within the AOA, the RPZs, and the aviation-related areas.

- **Open Space** - Open spaces are land areas unavailable for development due to airspace or restrictive dimensions (too small to develop).

- **Roadways** - Roadways on airport property are Faraldo Circle, Stickney Road, and unnamed connecting or recirculation roads.

SECTION 2
FORECASTS OF AVIATION ACTIVITY

2.1 INTRODUCTION

This section presents forecasts of aviation demand at Key West International Airport (EYW) through the year 2021. These forecasts provide information that will be used in subsequent sections of the master plan update to determine whether new airport facilities or improvements of existing facilities is warranted. In addition, the forecasts provide information concerning the timing that any new or improved facilities would be required. Ideally, facilities will be developed at the time they are required, thereby avoiding the costs associated with building too late or too early.

Forecasts of passenger enplanements (i.e., the number of people that boarded scheduled commercial aircraft) will be used in subsequent sections of this report to estimate future demand for passenger handling facilities, such as airport roadways, automobile parking, ticket counters, baggage carousels, etc. Likewise, forecasts of aircraft operations will be used to determine the future demand for airfield facilities, such as runways, taxiways, parking aprons, and fueling facilities. The forecasts presented in this section were prepared on the basis of historical annual activity through 2001 and monthly activity through April of 2002. Annual data for 2002 was subsequently added after completion and FAA approval of the forecast.

It should be noted that forecasting consists of the educated estimates regarding future activity levels. While past trends and current industry events provide clues regarding future levels of activity, the actual level of passengers and aircraft operations that will occur at EYW are unknown. Thus, the forecasts presented on the following pages should be reviewed with this fact in mind.

2.2 AIRPORT SERVICE AREA

An airport service area is the geographic region from which an airport derives the majority of its originating passengers. It is important to define an airport's service area before attempting to prepare forecasts because the socioeconomic data needed to prepare the forecast should be representative of the same geographic area. Items considered when defining an airport service area include roadway access, the location of competing airports, the relative strength of air service provided at competing airports, and other appropriate factors.

For the purpose of this master plan, the airport service area for EYW is considered to encompass all points between Key West and Vaca Key as shown in Figure 2.1. This does not mean that all residents located within this area will use EYW instead of competing airports such as Miami International Airport. It does mean that the majority of EYW originating passengers reside or are visiting within this geographic area.

2.3 ANALYSIS OF FORECAST FACTORS

A variety of factors are usually considered in the development of forecasts. Factors considered in the development of forecasts for EYW are described in the following paragraphs.

2.3.1 ECONOMY/TOURISM

The Key West economy is primarily based on tourism associated with recreational activities such as boating, commercial and recreational fishing, diving, snorkeling, and, like most other Florida cities, seasonal tourism. Tourism, which is at its peak in early spring, is the city's primary generator of economic activity. Because the vast majority (more than 80 percent)[1] of passenger enplanements at EYW are tourist related, the state of the economy and the health of the Key West tourism industry are significant factors affecting future passenger levels.

About two-thirds of all employment in Key West in 1990 were in either the retail trade or service sectors. Almost half of all retail trade positions were in eating and drinking establishments, and the professional and related category accounted for half of all service positions. Approximately 66 percent of the economic base is directly or indirectly tied to tourism. The economic bases of the city, in comparison to statewide averages, are high in retail trade and public administration employment and equally low in the manufacturing and wholesale trade sectors.

2.3.2 SEASONALITY

Seasonality is another factor considered when forecasting air travel. Demand for air travel in Key West is extremely seasonal. Typically, the peak month occurs during the first quarter of the year with March being the peak month. Approximately 40 percent of EYW's annual enplanements occur during this 3-month period. During the summer season, Key West attracts primarily Florida tourists, who are much less likely to fly to the Keys than the northern visitors who frequent the Keys during the winter and spring. To accommodate this factor, all forecasts projected in this study are based on the peak quantity of tourists and visitors expected during the year.

2.3.3 ROADWAY CONGESTION

Access to Key West is provided via U.S. Highway 1, which is the sole means of surface access to the island. Congestion on U.S. 1, particularly during peak periods, can make this mode of transportation less desirable to some travelers. It is anticipated that congestion on U.S. 1 will worsen in the future as traffic levels increase. The extent to which this roadway congestion will influence a traveler's choice of transportation is not known. However, it can be anticipated that as roadway congestion increases, air travel would become a more attractive mode of transportation to Key West.

2.3.4 COMPETING MODES OF TRAVEL

Some visitors to Key West are beginning to use alternative modes of transportation to the island. Ferry Service has been initiated by various operators from points such as Ft. Myers and Naples to Key West. In addition, a new high-speed catamaran is planned from Ft. Myers to Key West.

[1] The National Oceanic and Atmospheric Administration conducted a comprehensive study of visitors to the Florida Keys in 1996 entitled "Visitor Profiles: Florida Keys/Key West". This study provided an estimate of 199,687 visitors arriving through EYW from June 1995 through May of 1996. Therefore, the estimate that 80 percent of passengers at EYW are visitors was derived by dividing the 199,687 visitors by the 248,441 passenger enplanements recorded at EYW during 1995.

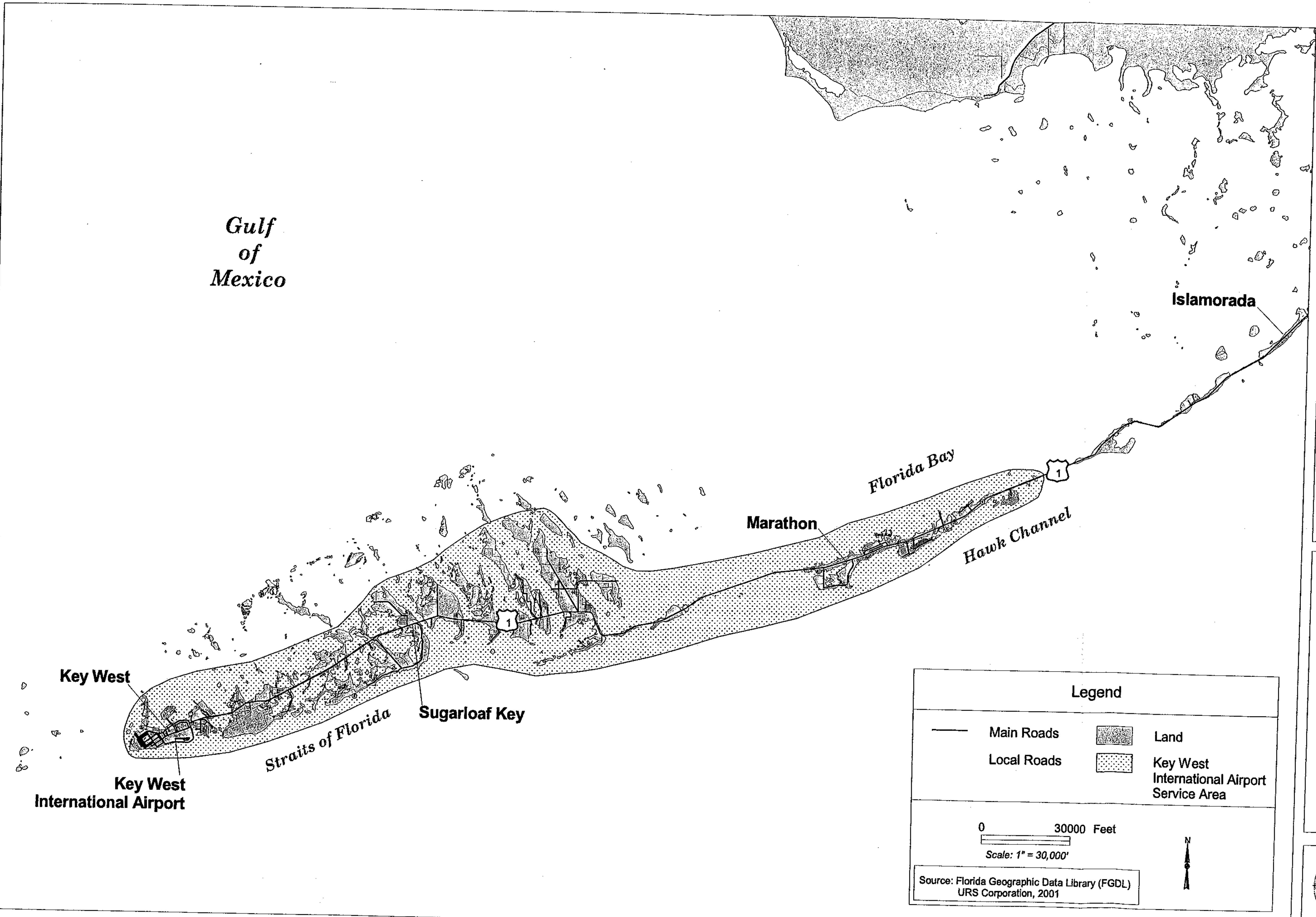


Figure 2.1

AIRPORT SERVICE AREA

Key West International Airport

Master Plan Update

These ferries provide an alternative to using air transportation from certain coastal points in Florida.

Trip time using the ferry service takes approximately 3 to 4 hours (one-way) as compared to 1 hour by air. Price is difficult to compare since there is significant variation in fares depending upon seasonal and advance purchase requirements. However, round-trip prices for ferry services range from $100 from Naples and Ft. Myers to $140 from Bradenton. By comparison, air travel costs generally range from $200 with advance purchase to as much as $500 with walk-up fares.

2.3.5 REESTABLISHING DIPLOMATIC RELATIONS WITH CUBA

Another factor that may impact future levels of passenger and operational activity at EYW is the potential for reestablishment of diplomatic relations with Cuba. Previous master plans for EYW speculated on the impact of this factor. The master plan conducted for EYW in 1974 estimated the future number of passengers between Key West and Cuba by using the number of passengers that occurred during the late 1950's and applying average annual growth rates. This methodology is extremely suspect and led to a "high growth" projection in the master plan of 2 million passengers between Key West and Havana by the year 1994.

Since the potential for the reestablishment of diplomatic relations with Cuba is pure speculation, there is no quantitatively valid method of estimating future passengers. Reliance on the number of passengers that occurred preceding the severance of diplomatic relations four decades ago bears no resemblance to the number of passengers that may be generated with air service at this time. Therefore, estimates for passenger generation related to this factor must be based upon judgment and the basic driving factors of the potential for this service. This issue will be discussed further in the forecasts of passenger enplanements.

2.4 HISTORICAL AIRLINE ACTIVITY

Understanding past trends of aviation activity and the factors influencing activity levels is important when projecting future growth. Therefore, historical activity statistics were compiled for airline activity. These data are presented and discussed in the following paragraphs.

2.4.1 PASSENGER ENPLANEMENTS

Annual historical passenger enplanement statistics recorded by EYW airport management personnel for the years 1970 through 2002 are presented in Table 2.1 and Figure 2.2. As shown, passenger enplanements have increased although the rate of growth has steadily decreased.

TABLE 2.1

HISTORICAL PASSENGER ENPLANEMENTS
Key West International Airport
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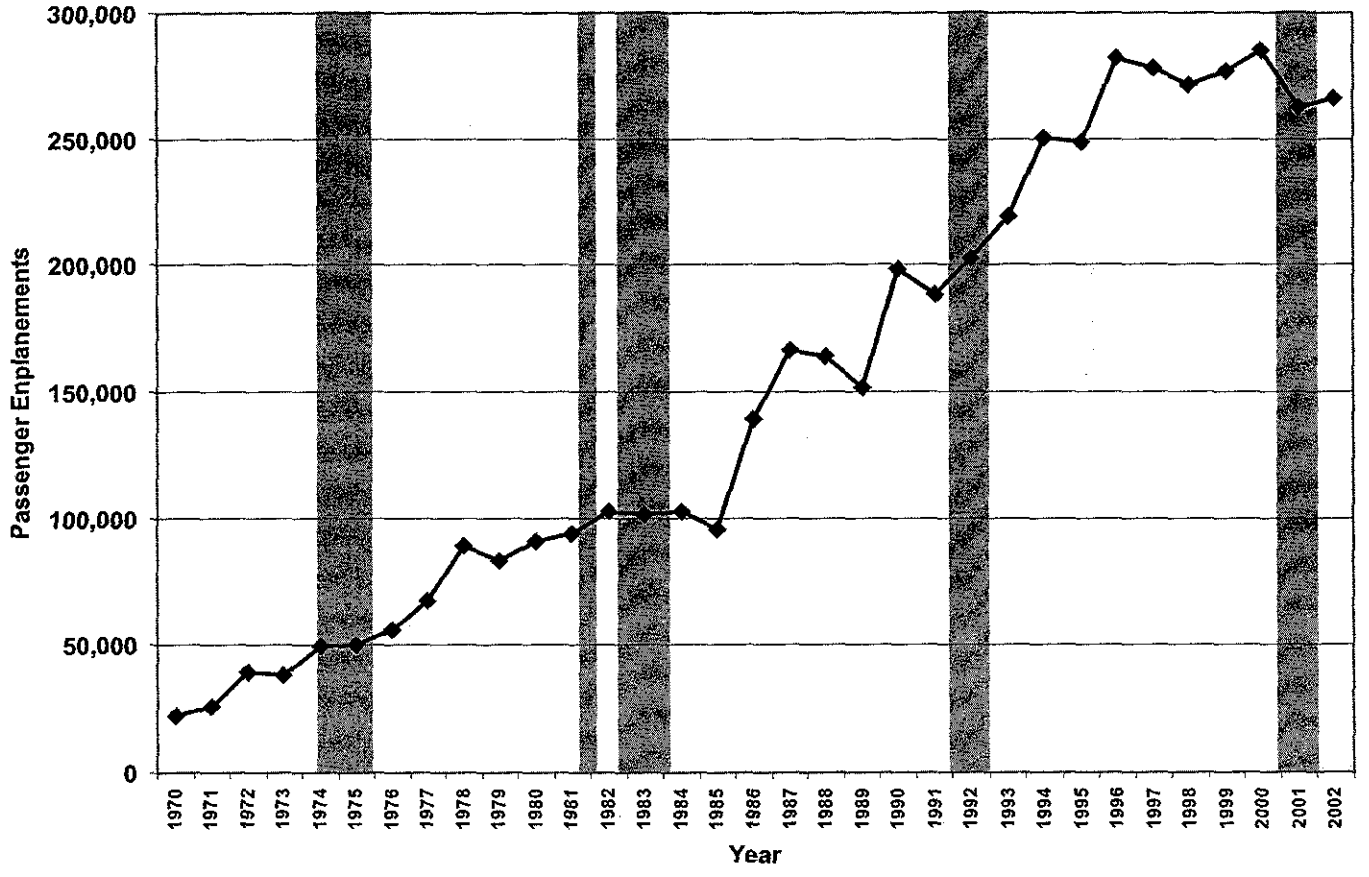
Year	Total Passenger Enplanements	Percent Increase or Decrease
1970	22,371	-
1971	26,066	16.5%
1972	39,523	51.6%
1973	38,667	-2.2%
1974	49,421	27.8%
1975	50,012	1.2%
1976	56,137	12.2%
1977	67,521	20.3%
1978	89,393	32.4%
1979	83,513	-6.6%
1980	91,226	9.2%
1981	93,643	2.6%
1982	102,700	9.7%
1983	101,361	-1.3%
1984	102,512	1.1%
1985	95,819	-6.5%
1986	139,575	45.7%
1987	166,395	19.2%
1988	164,124	-1.4%
1989	151,783	-7.5%
1990	198,510	30.8%
1991	188,364	-5.1%
1992	202,787	7.7%
1993	218,817	7.9%
1994	250,297	14.4%
1995	248,441	-0.7%
1996	282,193	13.6%
1997	278,025	-1.5%
1998	271,425	-2.4%
1999	276,829	2.0%
2000	285,372	3.1%
2001	262,761	-7.9%
2002	266,413	1.4%

Source: Key West Airport Management Records.

Figure 2.3 shows the average annual growth rate of passenger enplanements at EYW for each of the last three decades. The average annual growth during that period has decreased from 15 percent during 1970 to 1980, to 8 percent during 1980 to 1990 to 3.7 percent during 1990 to 2000. By comparison, the average annual growth rate for passenger enplanements in the United States was 4.8 percent from 1980 through 1990 and 3.6 percent from 1990 through 2000. Thus, during the last 10 years enplanements at EYW grew at approximately the same rate as enplanements across the nation.



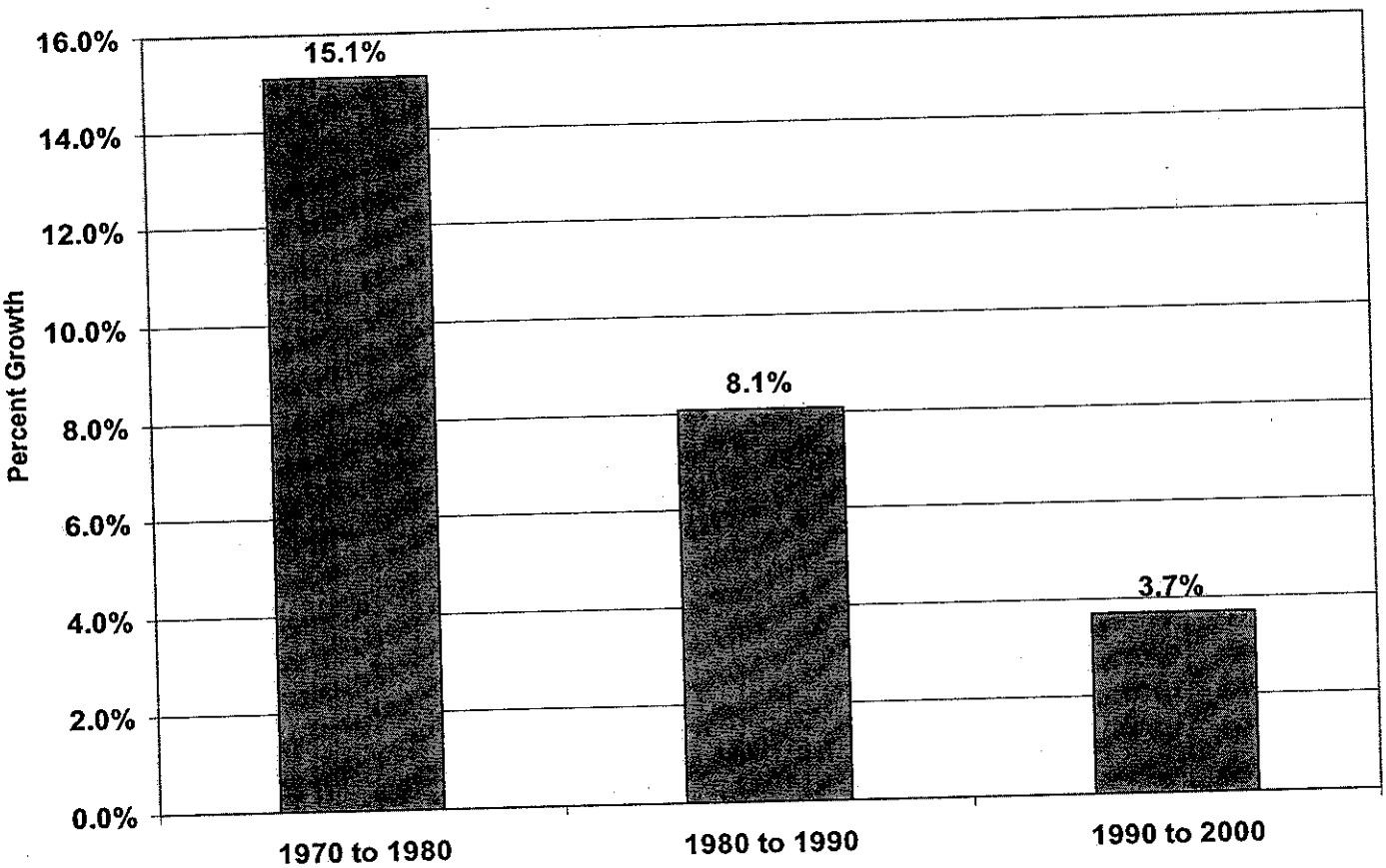
Note: Vertical shading indicates periods of economic recession.

GRAPHICS\KEYWEST\MPUPDATE2001_FIG-2-2.AI

Key West International Airport
Master Plan Update

HISTORICAL PASSENGER ENPLANEMENTS

FIGURE: 2.2



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HISTORICAL AVERAGE ANNUAL GROWTH RATE OF PASSENGER ENPLANEMENTS

FIGURE: 2.3

GRAPHICS\KEYWEST\MPUPDATE2001_FIG-2-3.AI

During 2001 passenger enplanements decreased 8 percent from the level attained in 2000 due to the terrorist attacks of September 11, 2001. Comparison of passenger levels during the months after the attacks show that passenger levels were down 20 to 30 percent from levels a year ago. However, by January of 2002, the decrease from the same month of 2001 had shrunk to 17 percent. During the subsequent months of February 2002 through April 2002, passenger enplanements were averaging 6 percent less than levels recorded during the preceding year.

2.4.2 MONTHLY PASSENGER DISTRIBUTION

On the basis of monthly enplanement data from 1998-2000, March has historically been the peak month for air travel at EYW. This trend is consistent with the high percentage of tourists during that period. The monthly distribution of passenger enplanements is presented in Table 2.2.

TABLE 2.2
MONTHLY DISTRIBUTION OF PASSENGER ENPLANEMENTS
Key West International Airport
Master Plan Update

Month	1998 Passengers	1998 Percent	1999 Passengers	1999 Percent	2000 Passengers	2000 Percent
January	26,421	9.7%	24,210	8.7%	26,662	9.3%
February	26,426	9.7%	25,069	9.1%	26,560	9.3%
March	30,854	11.4%	30,717	11.1%	30,109	10.6%
April	25,593	9.4%	27,889	10.1%	25,825	9.0%
May	26,674	9.8%	27,783	10.0%	27,432	9.6%
June	22,023	8.1%	22,425	8.1%	22,326	7.8%
July	20,473	7.5%	21,238	7.7%	21,524	7.5%
August	20,482	7.5%	19,739	7.1%	19,425	6.8%
September	14,502	5.3%	15,211	5.5%	16,350	5.7%
October	14,415	5.3%	19,023	6.9%	21,779	7.6%
November	23,580	8.7%	24,390	8.8%	25,156	8.8%
December	19,982	7.4%	19,135	6.9%	22,224	7.8%

Source: Key West International Airport Management Records.

The monthly distribution of passengers from 1998 through 2000 is depicted in Figure 2.4. As the figure indicates, the trend is fairly consistent from year to year, although variations of passenger levels can be seen during the months of September and October when hurricanes are more prevalent. The existence or even the potential for a major storm to pass near Key West can result in sudden decrease of tourists for short periods. Data for 2001 were not included in the figure due to the highly unusual effects of the September 11, 2001, terrorist attacks.

2.4.3 AIRLINE MARKET SHARES

An analysis of airline passenger enplanements was conducted to determine market shares. As presented in Figure 2.5, the top three airlines operating at EYW in 2000 included American Eagle with 35 percent of the market, US Airways with 24 percent, and Gulfstream with 21 percent. It is to be expected that American Eagle would have the largest share of the EYW market due to its connections with American Airline's large hub operations at Miami International Airport. Passengers that fly to or from Key West on American Airlines are likely